

NOTES ON THE GENUS *EUPHALERUS* OF JAPAN,
WITH DESCRIPTION OF A NEW SPECIES
(HOMOPTERA : PSYLLIDAE)*

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The genus *Euphalerus* is one of the members belonging to the tribe Ayrtaenini and known from the southern part of North America to the northern part of South America and India. This genus has been unknown from Japan so far, but *Metapsylla robiniae* SHINJI, 1938 seems to belong to the genus in having forewings (Fig. 1-R₁) with large pterostigma and typically sinuate venation, the quadrate genal cones (Fig. 1-R₃), the strongly arched thorax, and other structures of legs and genitalia of both sexes.

In the fall of 1968 another species belonging to the genus was found by me at the northern part of Osaka Prefecture on *Caesalpinia japonica*, and recently at Kasugayama, Nara Prefecture by Mr. HIURA. This species seems to be new to science and apparently one of the most beautiful psyllids in Japan. It is here described as *Euphalerus hiurai* in the present paper with some notes on its life history known up to the present. The developmental stages and their biology in detail of both *Euphalerus robiniae* and *E. hiurai* will be reported in the future.

Before going further, I wish to express my cordial thanks to Mr. Isamu HIURA of the Osaka Museum of Natural History who has been a great source of encouragement and helpful in material. My thanks are also due to Dr. Yasuo MAETA of the Tohoku National Agricultural Experiment Station in Morioka who placed the material at my disposal and kindly took photographs of galls of *Euphalerus robiniae*, and to Mr. Akinori NAKANISHI, General Education Department, Kyushu University for taking pictures of adult specimens of *Euphalerus hiurai*.

Genus *Euphalerus* SCHWARZ

Euphalerus SCHWARZ, 1904, Proc. Ent. Soc. Wash. 6: 238.

Head broad, as wide as or narrower than thorax, deflexed. Vertex flat, often rugose, not densely pubescent. Genal cones large, flat, on same plane as vertex, usually quadrate, rounded or more or less truncate apically, convergent or slightly divergent. Antenna usually short and slender, less than 1.5 times as long as width of head, sometimes long, with a pair of long apical setae. Eyes large, more or less recessive.

* Contributions from the Osaka Museum of Natural History, No. 178.

Thorax strongly arched and broad, never pubescent. Pronotum vertical. Propleurites usually equal in length dorsally, suture terminating at middle of lateral margin of pronotum. Forewing large and broad, membranous and often maculated or somewhat thickened and rugose, rounded or oblique apically, pterostigma usually large. Hind wing with M+Cu quite short. Legs robust, posterior tibia with or without basal spur, with several apical spurs; proximal segment of posterior tarsi with a pair of apical spurs.

Type-species: *Euphalerus nidifex* SCHWARZ, 1904, Proc. Ent. Soc. Wash. 6: 238-239 and 153-154 (Key West, Florida, U. S. A.).

Key to the species of *Euphalerus* of Japan

- 1(2) Forewing with M_{1+2} comparatively short, 1.3 times as long as M_{3+4} , with apical marginal band not reaching apex of Cu_2 , without maculation attached to Cu between M and Cu_1 ; length of forewing ♂ 1.6-1.8 mm, ♀ 2.0-2.1 mm.....*robinae* (SHINJI)
- 2(1) Forewing with M_{1+2} comparatively long, 1.6 times as long as M_{3+4} , with apical marginal band reaching apex of Cu_2 , with a distinct maculation attached to Cu between M and Cu_1 ; length of forewing ♂ 2.3-2.5 mm, ♀ 2.8-3.0 mm...*hiurai* sp. nov.

***Euphalerus robinae* (SHINJI, 1938) comb. nov.** (Fig. 1-R₁~R₃; Pl. 2-G~H)

Metapsylla robinae SHINJI, 1938, Kontyû 12(4): 147 (Morioka, Iwate Pref.).

Specimens examined: 49 ♂ 48 ♀, galls and nymphs, Nashinoki-cho, Morioka City, Iwate Pref., 19. vi. 1969, on *Gleditsia japonica*, Y. Maeta leg.

Distribution: Japan (Iwate Pref.).

Host plant: "Saikachi"—*Gleditsia japonica* MIQ. [Leguminosae]. (*Robinia pseudoacacia* recorded by SHINJI is error caused by misidentification of the host plant.)

General biology: According to personal communication from Dr. MAETA, this species has at least two generations a year and adults appear in June and August (ascertained on August 15th, 1969 by him). It seems that SHINJI made the original description basing on the adults of the second generation. Dr. MAETA could not find neither adults nor galls of this psyllid on *Robinia pseudoacacia* in Morioka.

Nymphs are distinct gall-formers and enclosed within the fold galls (Plate 2-G, H), but galls are less hypertrophied in comparison with the following species. It is still uncertain in what stage hibernation takes place in this species.

***Euphalerus hiurai* sp. nov.** (Fig. 1-H₁~H₈; Pl. 2-A~F)

Color: General color yellowish to light greenish brown. Vertex and genal cones entirely yellowish to greenish brown. Antenna yellowish brown, with apices of III~IX and X black. Eyes dark brown or black; ocelli red. Pronotum yellowish brown dorsad, dark brown laterally. Mesothorax markedly dark brown or often black; praescutum

sometimes lighter anteriorly; scutellum yellowish brown except for anterior portion. Metascutum usually yellow. Forewing (Fig. 1-H₁) transparent, mottled as shown in figure, with a rather conspicuous marginal band of brown along apical margin, from apex of Cu₂ to almost apex of Rs, with a somewhat triangular marking of dark brown or black at anterior side of Cu-stem; veins whitish with dark spots rather regularly. Legs yellowish brown; dorsal surfaces of anterior and middle femora dark brown. Abdomen yellowish brown to brown, lighter ventrally.

Structure: Head (Fig. 1-H₃) large, deflexed, slightly narrower than thorax. Vertex flat, more or less rugose, with a shallow discal impression on each side of median line, with short hairs, a little longer than half as long as wide. Genal cones large and broad, half as long as vertex or slightly longer, nearly contiguous, on same plane with vertex, somewhat quadrate, more or less obliquely truncate apically, but inner angle rounded, with long pubescence. Eyes moderately large, somewhat recessive. Antenna (Fig. 1-H₄) short, nearly 1.2 times as long as width of head, slender, with 2 long apical setae, approximate relative length of antennal segments as 5 : 4 : 12 : 10 : 9 : 9 : 9 : 10 : 6 : 6.

Thorax very broad, strongly arched, rugose finely, without pubescence; pronotum distinctly vertical, narrower than head including eyes; praescutum and scutum strongly convex; scutellum conversely trapezoidal, about half as long as wide. Forewing (Fig. 1-H₁) large, broad, subrhomboidal, 2.2-2.3 times as long as wide, narrowly rounded at apex; pterostigma very large and broad; Rs strongly curved cephalad apically at two-thirds; M-stem arched; M₁₊₂ subparallel with apical portion of Rs, ended almost at apex of forewing; medial cell very small; cubital cell larger than medial; clavus ended close to apex of Cu₂. Hind wing (Fig. 1-H₂) long and broad, nearly 4/5 as long as forewing, 2.5-2.6 times as long as wide, narrowly rounded at apex; venation conspicuously psylline, but M+Cu very short; R upturned apically; M more or less sinuate; cubital cell small, flat; C+Sc with several setae and 3 or 4 hooked frenulum basally. Legs short and massive, pubescent; posterior tibia (Fig. 1-H₆) without basal spur, with 2 outer and 2 inner apical spurs, with comb-like bristles along apical margin cephalad and outer-laterally; proximal segment of posterior tarsi with a pair of apical spurs; meracanthus (Fig. 1-H₅) moderately long, projected mostly caudad and scarcely ventrad, blunt at apex. Abdomen (excl. genital segments) short, less than half as long as thorax and head combined, in lateral aspect each tergite prominently produced dorsad behind central suture respectively, making a knob-like process, tergites not pubescent, sternites densely pubescent.

Male genitalia (Fig. 1-H₈) moderately large, about half as long as the rest of abdomen; proctiger long and slender, 1.5 times as long as forceps, in lateral aspect almost parallel-margined, slightly broad basally, rugose apically, obliquely truncate at apex, with thick pubescence densely on apical two-thirds; forceps elongate, sparsely hairy, in

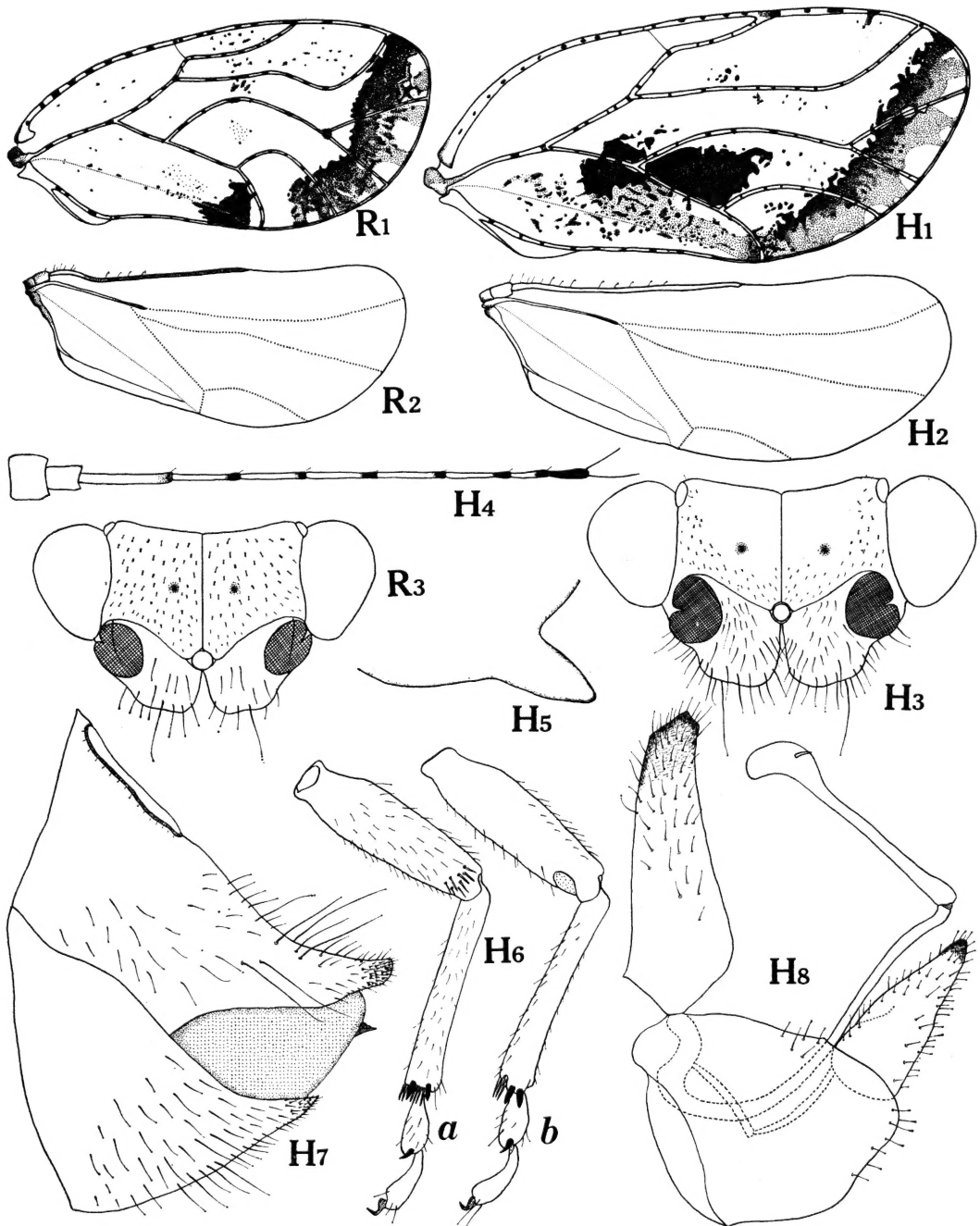


Fig. 1. R, *Euphalerus robiniae* (SHINJI), ♀ (R1, Forewing; R2, Hind wing; R3, Head). H, *Euphalerus hiurai* sp. nov. (H1, Forewing, ♀; H2, Hind wing, ♀; H3, Head, ♀; H4, Right antenna; H5, Meracanthus, ♂; H6, Posterior leg—a, outer side, b, inner side; H7, Female genitalia; H8, Male genitalia).

lateral aspect broad basally, tapered to blunt apices, inner face with a conspicuous fold anteriorly extending obliquely toward apex and many retrorse setae in basal half; aedeagus long, with the second segment thickened apically, relative length of the first and the second segments as 4 : 3; subgenital plate somewhat pentagonal, 1.5 times as long as high, with hairs only at dorso-caudal margin. Female genitalia (Fig. 1-H₇) long, almost 3/4 as long as the rest of abdomen; dorsal valve in lateral aspect distinctly longer than ventral, with dorsal margin descending, apical portion narrow, but less attenuate, rather truncate at apex, with long pubescence; inner valve almost as long as or slightly shorter than dorsal, longer than ventral; ventral valve in lateral aspect subtriangular, with dorsal margin bisinuate, hairy in apical half, with an acute apex.

Length of body ♂ 2.0-2.1 mm, ♀ 2.3-2.6 mm; to tip of folded wings ♂ 2.8-3.1 mm, ♀ 3.3-3.5 mm; length of forewing ♂ 2.3-2.6 mm, ♀ 2.8-3.0 mm; width of forewing ♂ 1.0-1.1 mm, ♀ 1.3 mm; length of hind wing ♂ 2.0-2.1 mm, ♀ 2.5-2.6 mm; width of hind wing ♂ 0.7-0.8 mm, ♀ 0.9-1.0 mm; length of antenna ♂ 0.9-1.0 mm, ♀ 1.0-1.1 mm.

Holotype (♂): Hatsutani, Nose, Osaka Pref., 8. ix. 1968, on *Caesalpinia japonica*, Y. Miyatake leg. (deposited in the collection of Osaka Museum of Natural History).

Paratopotypes: 77 ♂ 88 ♀ (2 ♂ 2 ♀ mounted on slides), Hatsutani, Nose, Osaka Pref., 8. ix. 1968, on *C. japonica*, Y. Miyatake leg.; 6 ♂ 10 ♀, Hatsutani, Nose, Osaka Pref., 27. ix. 1971, on *C. japonica*, Y. Miyatake leg.; 1 ♂ 1 ♀, Hatsutani, Nose, Osaka Pref., 27. ix. 1972, on *C. japonica*, Y. Miyatake leg. Paratypes: 1 ♂ 1 ♀, Takisaka, Kasugayama, Nara Pref., 3. x. 1973, on *C. japonica*, Y. Miyatake leg.

Distribution: Japan (Osaka Pref., Nara Pref.).

Host plant: "Jaketsu-ibara"—*Caesalpinia japonica* SIEB. et ZUCC. [Leguminosae].

Differs from *E. robinae* (SHINJI, 1938), although resembling in general features, in being much larger, in having forewing with a distinct maculation around a junction of M and Cu and shorter M_{3+4} , genal cones more rounded apically, antenna longer than width of head, male forceps nearly straight apically, and less attenuate female genitalia. Differs from *E. vittatus* CRAWFORD, 1912 from India in maculation of forewings and shape of genal cones.

General biology: This psyllid has only one generation a year. Hibernating takes place in the stage of egg. Among Japanese psyllids this habit is rather unusual, although known in *Pachypsylla japonica* Y. MIYATAKE, 1968. After long incubation period the first instar may begin to hatch from late May to June. Hatched nymphs reach young shoots and start sucking. Infested leaves stop their normal growth and become fold galls (Plate 2-E, F) enclosing nymphs within. Grown galls are well swollen and 6-8 mm in length, and each gall usually keeps 1 or 2 nymphs, sometimes 3 to 6, inside. By the end of August most of nymphs finish molting to become the fifth instar. From the beginning to middle of September full-grown nymphs crawl out from galls (Plate 2-D)

and emerge outside. Copulation occurs soon after emergence. Females start to lay eggs from middle to later part of September, laying one by one strictly on the surface of trunk part of the host plant. After middle of October no adults can be found on the host plant.

Collecting data of galls and nymphs : Galls & nymphs, Hatsutani, Nose, Osaka Pref., 8. ix. 1968, on *Caesalpinia japonica*, Y. Miyatake leg. Galls & nymphs, Hatsutani, 9. vii. 1969, on *C. japonica*, Y. Miyatake leg. Gall & nymphs, Takisaka, Kasugayama, Nara Pref., 5. viii. 1973, on *C. japonica*, I. Hiura leg. Vacant galls and two adults, Takisaka, Kasugayama, 3. x. 1973, on *C. japonica*, Y. Miyatake leg.

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Explanation of Plate 2

- A : *Euphalerus hiurai* sp. nov., male.
 B : *Euphalerus hiurai* sp. nov., female.
 C : Adult of *Euphalerus hiurai* sitting on leaf of the host plant.
 D : Last instar of *Euphalerus hiurai* on underside of leaf.
 E : Galls of nymphs of *Euphalerus hiurai* on *Caesalpinia japonica* (showing whole small leaves becoming galls).
 F : Galls of nymphs of *Euphalerus hiurai* on *Caesalpinia japonica* (showing some small leaves becoming galls).
 G, H : Galls of nymphs of *Euphalerus robinae* on *Gleditsia japonica*.

